REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

Claim 1 has been amended to further recite that the tubes of the EGR cooler extend substantially horizontally. The basis for this is found in the description of the vertical direction in paragraph [0008]. That is, the cold water in the pipe 4 and the bypass outlet pipe 5a were conventionally "vertically oppositely arranged such that the latter is above the former" in Figure 1. Since the direction of the arrows 9 in Figure 1 is the vertical direction, the transversely extending pipes thus extend horizontally. Similarly, paragraph [0024] describes that the communicating holes 12 are arranged such that one of them is the "highest one" of the communicating holes and serves as an air vent for discharge of air out of the shell. This establishes that the view of Figure 3 is in a vertical plane, so that the axis of the tubes is horizontal. The significance of this orientation is explained below.

Claim 1 now further recites that the shell has an end connected to a source of exhaust gas, in that the cold water inlet pipe is connected to a source of cooling water. The basis for both of these features is believed to be clear from the disclosure.

Claims 1 and 2 have otherwise been amended for clarity. The rejection under 35 U.S.C. § 112 is believed to be moot in view of the presently amended Claims 1 and 2.

New Claims 3 and 4 respectively depend from Claims 1 and 2, and further recite the coolant water discharge chamber exemplified by element 14 in Figure 2.

A conventional EGR cooler such as that shown in Figure 1 is a gas/liquid heat exchanger in which the vehicle exhaust gas is cooled with cooling water. Being positioned in a vehicle, it is in a generally high temperature environment and so maximizing its heat exchange efficiency is important. Additionally, the space constraints in a vehicle require that it be compact and flexible in the arrangement of the inlet and discharge pipes, particularly that for the coolant fluid. For example, air is frequently admixed with the cooling water

being supplied to the EGR cooler, and must be vented for maximum cooling efficiency. Conventionally, this was done by a pipe arranged vertically above the coolant water inlet pipe, which further restricted the arrangement of the EGR cooler in the vehicle (paragraphs [0008]-[0009]).

According to a feature of the invention set forth in the claims, one end of the shell surrounding the tubes of the EGR cooler is provided with an annular coolant water supply chamber having a coolant water inlet pipe, including communicating holes in the portion of the shell surrounded by the supplied chamber. By virtue of this arrangement, the inlet pipe may have any angular orientation about the circumference of the shell (see e.g., Figures 3-5), and the communication hole formed at the topmost portion of the coolant water supply chamber will provide the air venting function (paragraph [0024]). Thus, the EGR cooler can have high efficiency and flexibility of mounting when being mounted in the tight, high temperature confines of a vehicle.

Claims 1 and 2 were rejected under 35 U.S.C. § 102 as being anticipated, or under 35 U.S.C. § 103 as being obvious over, Japanese patent publication JP 61-3999. This rejection is respectfully traversed in view of the presently amended claims.

JP '999 is directed to a *vertical* shell and tube type heat exchanger, for exchanging heat between fluids A and B. Fluid B is introduced axially downwardly through a central vertical pipe, and returns axially upwardly through the surrounding heat exchange tubes 5. The other fluid A is introduced at a mid portion along the height of the heat exchanger via the inlet 1, and flows upwardly to enter the heat exchanger tubes 5 via upper windows 4. To this end, a plurality of guide vanes 10 create a spiral flow for the coolant A in order to provide a more uniform distribution of the fluid A. The fluid A subsequently flows downward through the heat exchanger tubes and is discharged at the bottom outlet 7.

The Office Action indicates that the rejected claims read on a heat exchanger, *per se*, because the recitation of the fluids being heat exchanged does not impart patentability to the structure itself. In response, it is noted that Claim 1 has been amended to recite that the shell has an inlet connected to a source of exhaust gas and that the coolant-water inlet pipe is connected to a source of cooling water, and so the claim is structurally limited to an EGR cooler.

Claim 1 now also recites other structural distinctions with respect to the vertical heat exchanger of JP '999. For example, it recites that the plurality of tubes have *substantially horizontally* extending axes, as compared to the *vertical* heat exchanger of JP '999. It also recites that the shell has an inlet at the first end and an outlet at the second end. In contrast, the fluid B in JP '999 enters and exits at the same end, whereas the fluid A enters at a mid portion of the heat exchanger shell. Neither enters at one end of the shell and exits at another end.

Finally, Claim 1 now recites that the annular coolant water supply chamber, coolant water inlet pipe and communicating holes are all at the first axial end of the shell. In contrast, the inlet pipe A of JP '999 is at a mid portion of the shell and is axially offset from the windows 4. Thus, not only does Claim 1 now include structure directed to exhaust gas cooling, but recites structural features of the shell which are not present in JP '999. Claim 1 is therefore believed to define over this reference.

Dependent Claim 2 has been clarified to recite that the portion of the shell surrounded by the supply chamber and at a circumferential location facing the inlet pipe has no communicating holes. This is shown in, e.g., Figure 3, whereby the cooling water must diverge circumferentially in two directions to reach the communicating holes 12. This feature is not taught in JP '999. While it is true that the fluid A entering the inlet 1 in JP '999 does not face one of the windows 4, this is because all the windows are *axially* offset from

the inlet 1; there are no communication holes (windows 4) at any circumferential location of the shell 3 at the axial position of the inlet pipe 1. On the other hand, the figures indicate that, if one disregards the axial offset of the windows 4 with respect to the inlet 1, the portion of the shell 3 at the circumferential location facing the inlet pipe 1 has one of the communication holes (windows) 4. For this reason as well, Claim 2 is believed to define over JP '999.

Concerning dependent Claims 3 and 4, JP '999 lacks an annular coolant water discharge chamber; the fluid A is discharged axially from a central outlet 7.

Applicants therefore believe that the present application is in condition for allowance and respectfully solicits an early Notice of Allowability.

Respectfully submitted,

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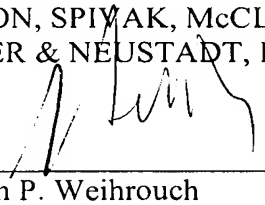

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